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B. In the Cracow centre, work on metallurgy is concentrated mainly in the Department of Metals of the Polish Academy of Sciences Institute of Fundamental Technical Research, in the Academy of Mining and Metallurgy, and in the Foundry Institute.

The Department of Metals of the Polish Academy of Sciences Institute of Fundamental Technical Research is doing fundamental research above all on metallurgy and related disciplines.

In the realm of theory of metallurgical processes Professor A. Krupkowski and his co-workers have dealt with the following subjects: solution of the Gibbs-Duhem equation has been applied to a multi-component system; determination of the thermodynamic functions of components in solutions of metals; elaboration of a thermodynamic theory of solution; and classification of the reduction of metal oxides with carbon. Moreover, a theory has been worked out concerning zinc and cadmium rectification.

Professor W. Domański determined the thermodynamic properties of solid solution of silver with oxygen in the temperature range 200°—800° C.

Professor E. Iwanciw has studied the influence of pressure on the reduction of iron and nickel oxides, and has worked out a theory of the rate of these reductions as depending on the extent to which the system has moved from the state of equilibrium. The results obtained make it possible to determine optimum conditions for the reduction of metal oxides with carbon.

Professor W. Ptak has worked on the problem of determining the thermodynamic properties of components in two- and three-component systems by theoretical and experimental means. His most important achievements include work on irregular solutions, especially on liquid zinc-tin solutions and iron-oxide and nickel-oxide systems.

As concerning solutions of metals and sulphides, Assistant Professor A. Bolck-Bolten has analyzed several two- and multi-component systems. Moreover, he has developed the statistical theory of solutions on the basis of his own researches on the thermodynamics of liquid

chlorides and bromides of lithium, potassium, calcium and magnesium, in equilibrium with a gaseous phase of hydrogen chloride and hydrogen bromide. These experiments have revealed the influence of the elementary properties of cations on the anion exchange reaction between phases.

In physical metallurgy and plastic deformation of metals we must mention investigations concerning the deformation of single crystals during tensile tests, elaboration of the theory of flat specimens, investigation of the influence of the rate on the deformation resistance of copper, brass, lead, and tin (Professor A. Krupkowski), and also the development of a method for determining the degree of micro segregation in metals on the basis of the measurement of electromotive forces (Assistant Professor A. Piotrowski).

Further, a study is being made of the possibility of extending the theory of magnetic coercivity of iron to disk-shaped inclusions, and an attempt is in progress to verify this concept experimentally; work is also being done to introduce economy alloys into the metallurgical industry. As regards such alloys, mention should be made of new economy alloys such as low copper alloys, an aluminium-magnesium alloy, and alloys of zinc, magnesium and copper (Professor A. Krupkowski, Assistant Professors C. Adamski and W. Precht).

Among the achievements of the Department of Metals, attention should be drawn to investigations under the guidance of Professor W. Truszkowski, who has taken up the problem of the stresses in the neck of metals under tension, methods of determining the anisotropy of plastic metals, the relations between the parameters of tensile tests and the hardness of the metals tested. The most important achievements of Professor Truszkowski include the theory of heterogeneity of plastic metals which permit determination of the degree of non-homogeneity of metals on the basis of tensile or hardness tests. Moreover, a method developed for determining stresses in deformed metal has made it possible to explain how the deformation develops in the neck of metal under tension, regarding the non-homogeneity of the deformation.

A major achievement of Assistant Professor J. Wantuchowski is his work on the influence of the rate of deformation on the size of specimens in tensile tests. In this work, he proved the existence of two separate zones of deformation, under constant load (creeping) and under increasing load.

A picture of the whole scientific activities of the Department of Metals, as expressed in published papers, is given in Table 3.